NOTES ON AUSTRALIAN ABORIGINAL STONE WEAPONS AND IMPLEMENTS.

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(Plates xxix.-xxxvi.)

xvi.—*Tomahawks and Axes.*

It was explained in my last Paper*, communicated to this Society on February 25th last, that for an opportunity of describing the present fine series of stone tomahawks and axes, thanks are primarily due to Sir W. Macleay, Mr. C. W. De Vis, Dr. J. C. Cox, and others to be severally mentioned under their respective specimens.

In such descriptions much difficulty is experienced from the want of some satisfactory method of classification, whether it be from the point of view of their physical characters, mode of preparation, or apparent use by those who employed them in their daily avocations. At present, no such classification exists, so far as I know, nor do I at present feel prepared to propose a permanent one. The difficulties attending this will be touched on more at length on another occasion. No doubt the most convenient place to attempt some such classification would be an extensive museum collection, any series formed by a private collector being of too limited a nature for the object under consideration. With the view, however, of simplifying the descriptions which follow, I have tentatively grouped the implements under the succeeding three groups, and two other subsidiary sections, divisible into various types.

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* Abst. Proc. Linn. Soc. N. S. Wales, February 25th, 1891, p. iii.

Group I.—TOMAHAWKS.

Section A.—*Without a hafting groove.*

1. Oblong-ovate type.
2. Ovate type.
3. Deltoid, or subtriangular type.
4. Gad-shaped type.
5. Chisel-shaped type.

Section B.—*With a hafting groove.*

1. Ovate type.

Group II.—HAFTED AXES.

Group III.—HAND-AXES AND WEDGES.

In the succeeding descriptions the following terminology has been made use of:—The *lateral surfaces* are the more or less broad sides of the tomahawk; the *cutting edge* the generally curved sharp edge, produced by grinding the lateral surfaces; the portion of the latter ground at the anterior end is the *bevel;* the opposite end to the cutting edge, or posterior end, is the *butt;* the secondary surfaces, caused by striking off flakes, and usually conchoidal, are the *facets.*

I.—TOMAHAWKS.

Section A.—*Without a hafting groove.*

I opine that this section will comprise by far the largest number of aboriginal stone implements commonly known under the name of "tomahawks," excepting perhaps those of Western Australia, which will require separating as a distinct group.

1. *Oblong-ovate Type.* Of this form an excellent example has been lent for examination by Mr. Herbert Lowe, of Gooree, Mudgee, unchipped, and partially polished. It is composed of a very dark green hornblende and epidote rock*, and was originally an oblong, narrow pebble, with a highly roughened surface, arising from attrition. The broader end has been ground to a

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* I am indebted to Prof. T. W. E. David for assistance in determining the petrological characters of the various specimens, but from macroscopical inspection only.

sharp cutting edge, the bevel smoothed off and polished. The cutting edge is sharp, and fairly equal in its curvature.

The following are the measurements of this tomahawk:—Length, $5\frac{1}{4}$in.; breadth, $2\frac{1}{2}$in.; thickness, $1\frac{3}{4}$in.; weight, 1lb. 1oz.

Similar to Mr. Lowe's tomahawk are two from Braidwood, New South Wales, for which I am indebted to Mr. J. W. Penney, of Braidwood, forwarded through Mr. C. Roberts, J.P., of Boro. Both, originally pebbles, have been reduced in bulk by chipping, one much more so than the other. The least chipped (Pl. XXIX., figs. 1 and 2) is composed of very hard greenish diorite, probably containing a little free quartz, and has been thinned-off at both ends, leaving the centre the thickest part. The anterior end has been sufficiently ground to produce a sharp and very symmetrical cutting edge, and a flat bevel. This implement measures:—Length, $5\frac{1}{4}$in.; breadth, $2\frac{3}{4}$in.; thickness, $1\frac{3}{8}$in.; weight, 14oz.

The amount of chipping is not great, the working being confined to a few large facets near the butt. The second Braidwood specimen, on the other hand, is highly facetted by chipping, the rock of which it is composed, a greenish-black dioritic aphanite, lending itself to the process admirably, with a strongly marked conchoidal fracture. The cutting edge is remarkably true, and like the bevel, well executed, with the polished surface, which is exceedingly smooth and glossy, continued backwards for quite half the length of the implement; the gently convex surface is quite equal on both sides. The measurements are:—Length, $4\frac{3}{4}$in.; breadth, $2\frac{1}{2}$in.; thickness, $1\frac{5}{8}$in.; weight, 13oz.

Another illustration of this group is the well executed tomahawk already described in our "Proceedings,"* from Brisbane Water, near Gosford, composed of a dense, greenish-black, fragmental, basic rock, forming a very compact and neat implement.

The next specimen of this type is from Sir. W. Macleay's Collection, and although larger, is not so truly or excellently made.

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* Proc. Linn. Soc. N. S. Wales, 1890, v. (2), Pt. 2, p. 292.

It is composed of a dark green greywacke, perhaps an altered mudstone, and has been formed from an unchipped elongated-oval pebble by grinding one side flat, and partially so the other. By this means the bevel of the cutting edge has been reduced to a minimum, and to a low angle not often met with in our aboriginal tomahawks, whilst the cutting edge is very obliquely rounded, protruding at what was probably the lower anterior corner. The surface, where not smoothed, is much pitted and worn. The measurements are:—Length, $5\frac{1}{2}$in.; breadth, $3\frac{1}{4}$in.; thickness, $1\frac{2}{8}$in.; weight, 1lb. 4oz.

An excellent example of the flaked form in this type is afforded by a tomahawk from New England, presented by Mr. H. W. Blomfield (Pl. XXIX., figs. 3 and 4). The original size of the stone has been entirely reduced by chipping, leaving a rude and uneven anterior end, partially bevelled off by friction. In its present condition the cutting edge is rough and broken. The facets do not show that marked diminution forwards, usually seen in aboriginal tomahawks, but on one side are as large at the anterior end as at the butt. The stone of which this implement is composed is a silicified claystone allied to lydianstone. The measurements are:—Length, $4\frac{1}{2}$in.; breadth, $2\frac{5}{8}$in.; thickness, $1\frac{3}{8}$in.; weight, $10\frac{1}{2}$oz.

Appertaining to this group are two small tomahawks presented to the Mining and Geological Museum by the Rev. J. Milne Curran, from the Macquarie River, but beyond their rather diminutive size they are not remarkable. Both are converted pebbles, one (*a*) simply by friction, the other (*b*) by chipping and friction. The former (*a*) is composed of a greenish-black aphanitic diorite, and is slightly triangular in shape, increasing in breadth from the butt forwards. The cutting edge and bevel are both good, the former being straighter and less curved than usual.

In the second of these diminutive tools (*b*) the stone is a greenish-black diorite, speckled with small aggregates of triclinic felspar. The cutting edge is less true, having what my colleague, Mr. W. Anderson, has termed "a curvature in the line of its greatest width."* The bevel is the only portion polished, the remainder showing strong traces of either fracture or chipping. Measurements:—(*a*) Length, $3\frac{3}{8}$in.; breadth, 2in.; thickness, $1\frac{1}{8}$in.; weight, 6oz. (*b*) Length, $3\frac{1}{2}$in.; breadth, $2\frac{1}{8}$in.; thickness, $1\frac{2}{8}$in.; weight, 6oz.

As a last representative of this group may be mentioned a tomahawk of a dark green indurated diabasic tuff in the Mining and Geological Museum, from Dilga West, of an elongately oval shape. It has been a pebble, much weather-worn on the surface, and was evidently selected by its owner on account of the appropriate shape of the pebble, the only reduction it has undergone being a little chipping at the butt, which is square ended. The cutting edge is limited, and the bevel angle low. The measurements of this stone are:—Length, $4\frac{7}{8}$in.; breadth, $2\frac{5}{8}$in.; thickness, $1\frac{4}{8}$in.; weight, 2℔. 1oz.

2. *Ovate Type.* By this form I intend to convey the impression of a tomahawk, less elongated transversely than in Type 1, and wider in proportion in a contrary direction, but still too long to be absolutely oval. Such implements are also usually larger. No better example of this form can be taken than one in Sir W. Macleay's Collection, formerly exhibited by Mr. J. G. Griffin,† and said to have been dredged from the Hawkesbury River. It is a pebble of diabasic dolerite, quite untouched with the exception of the ground bevelled edge, the remainder of the surface being smooth and unpolished. The bevelled edge does not show the same amount of finish as many other implements of a similar nature, as the scratches arising from the process of grinding still remain, and have not been removed by the after process of polishing which many aboriginal tomahawks certainly have undergone. The scratches in question show that the friction employed to produce the bevelled edge was not confined to one direction, for some of the striæ are in that of the longer axis, others in that of the shorter, and a third set have an oblique

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* Records Geol. Survey N. S. Wales, 1890, ii., Pt. 2, p. 74.

† Proc. Linn. Soc. N. S. Wales, 1884, viii., p. 442.

direction. The measurements of this implement are:—Length, $5\frac{1}{2}$in.; breadth, $3\frac{7}{8}$in.; thickness, 2in.; weight, 1℔. 1oz.

Of a similar type, but both partially polished and chipped, is another tomahawk from the same collection, of a reddish-hue, and composed of a felspathic quartzite (Pl. xxx., figs. 1 and 2). Like the preceding, it also appears to have been a pebble, of which the end selected to serve as the butt has been much flaked off, a process to which the stone seems to have readily yielded. The anterior, or fore end, has a long and well executed bevel, the curve of the cutting edge being one of the most perfect I have yet seen on a tomahawk of this description. If an imaginary line be drawn across the centre of the tomahawk, in the direction of its longer axis, the curve of the cutting edge will be found to be almost equilateral. Although the bevelled surface bears an excellent polish, the friction striæ still remain, and are chiefly transverse in their direction. The flakes at the butt have also been chipped in a similar line, and to such an extent as to render the anterior end the thicker by far. The measurements are:—Length, $4\frac{7}{8}$in.; breadth, $3\frac{2}{8}$in.; thickness, $1\frac{2}{8}$in.; weight, 14oz.

A somewhat heavier, larger, and longer weapon, but of this type, is before me from the Queensland Museum. It is composed of a hornblende schist, extensively flaked at the posterior end, and partially polished anteriorly. The locality is Fraser's Island, (? Hervey Bay). It would appear to have been a pebble, reduced at the butt by percussion, and laterally ground to some extent. The bevel is rather a high one, and the cutting edge again shows an irregularity of curvature, tending much towards one side. This is not a shapely or well finished implement, but is heavy and formidable. The measurements are:—Length, $5\frac{1}{2}$in.; breadth, $3\frac{1}{2}$in.; thickness, $1\frac{7}{8}$in.; weight, $1\frac{3}{4}$℔.

A smaller and much ruder tomahawk is from the same locality and contained in the same collection. It is composed of a similar rock, and has been prepared in a like manner, but the cutting edge is much broken.

Another Queensland example of this series, and a rather peculiar one, is from Bulloo, Mogul Creek, Bulloo River, Thargomindah, presented to the Mining and Geological Museum by Mr. H. A. Maclean. It clearly belongs to this type, but has been much reduced by the violent usage to which the butt has been subjected, breaking off large conchoidal and irregular pieces until hardly more than the bevelled sides are left. The latter, however, are very fine, long, quite smooth, well polished, and unequally convex. The cutting edge is broad and symmetrical. Measurements in this case are unnecessary. The rock is a dark green chloritic quartzite showing faint lines of lamination.

3. *Deltoid, or subtriangular Type.* This is perhaps one of the less common forms of stone tomahawk, the specimens exhibited, three in number, being certainly peculiar in shape. The first is from Normanton (Pl. xxx., figs. 3 and 4), again communicated, like so many of these fine implements, by Mr. C. W. De Vis, from the Queensland Museum Collection. It is a remarkably short and broad tomahawk, oval-deltoid in shape, originally a flattened pebble of dark green diabase or hypersthene gabbro. The butt has been chipped, but the remainder of the surface is quite smooth and glazed. The broader end has been ground on both sides to a cutting edge possessing a wide circular sweep, moderately symmetrical in its curvature. The measurements are:—Length, 3¼in.; breadth, 3½in.; thickness, 1⅛in.; weight, 11 oz.

Supposing this weapon to be hafted it would not, by any means, be unlike some of the small single-handed battle axes used by the knights of old. Of a similar type to the present is, I believe, the tomahawk figured by Smyth from the Munara district,* composed of a highly polished aphanite. It is much larger, however, than our example, and weighed two pounds four and a-half ounces. It is, of course, possible that this implement may appertain to the next general group, which I have termed "axes" in contradistinction to "tomahawks," but its resemblance in shape to the Normanton tomahawk has induced me to refer to it here.

The second of these deltoid implements is from the Macquarie River, by the Rev. J. Milne Curran. It is an obtuse sub-deltoid piece of rock produced by chipping and friction, with the butt end squared-off, or hammer-head shaped. The bevelled faces are longer than in the first example of this type, and the cutting edge but little curved. It is composed of a dark green diorite with triclinic felspar, macroscopically developed in an aphanitic base, and is heavy for its small size. Its measurements are :—Length, $2\frac{5}{8}$in. ; breadth, $2\frac{5}{8}$in. ; thickness, $1\frac{4}{8}$in. ; weight, 8oz.

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* Aborigines of Victoria, 1878, i., p. 368, f. 181.

The third tomahawk of this series is equally peculiar with either of the others, if not more so, from its very short and broad proportions, the high angle of the bevelled faces, and particularly straight cutting edge. It seems to have been made out of a rough haphazard piece of grey diorite (triclinic felspar and hornblende) very much weathered, certainly not from a pebble. As sometimes happens in these implements, one face is longer than the other, and thus destroying the bilateral symmetry of the tomahawk. The cutting edge is straight and long. The measurements are:—Length, $2\frac{6}{8}$in. ; breadth, $2\frac{6}{8}$in. ; thickness, $1\frac{4}{8}$in. ; weight, 10oz.

4. *Gad-shaped Type.* This is a very interesting and well marked section, and does not seem to have been much noticed by authors. The form is always long, the transverse always greatly exceeding the longitudinal diameter, the section almost always more or less rounded, sometimes slightly flattened at the sides, and very rarely quadrangular.

Two examples of this form are lent by Sir W. Macleay, but beyond the fact that they are New South Welsh, no further history is known. Both have been pebbles. One, of greenish syenitic granite, is square-headed at the butt, whilst the original rotundity of the pebble has not in any way been interfered with. The anterior end is very narrow, remarkably so for an aboriginal tomahawk, and in consequence the cutting edge is much reduced, and the curvature very slight. The other example is composed of a fine-grained dark green diorite, and has had the natural rotundity of the pebble reduced by friction, producing flattened sides, and the butt is obtusely pointed. The cutting edge is broader than in the last specimen, though by no means greatly curved, whilst the bevel is at a very low angle. The measurements are:—Granite: Length, 5in.; breadth, 2in.; thickness, $1\frac{7}{8}$in.; weight, 1℔. Diorite: Length, $5\frac{7}{8}$in.; breadth, $2\frac{3}{8}$in.; thickness, $1\frac{3}{8}$in.; weight, 1℔. 1oz.

A very typical specimen of this section is from the Collection of the Mining and Geological Museum, consisting of a dark green, fine-grained diorite (Pl. XXXI., figs. 1 and 2). It was originally a transversely elongated weather-bitten pebble, which has been reduced to the required dimensions both by partially rubbing at the sides and chipping at the butt, which is square-headed, like that of syenitic granite, already described. The cutting edge is very narrow, and obtusely pointed, the bevelled surface being small but beautifully smoothed off and partially polished. Length, 6in.; breadth, 2in.; thickness, $1\frac{6}{8}$in.; weight, 1℔. 3oz.

The largest example of this type is one kindly presented to the Mining and Geological Museum by Dr. J. C. Cox, an elongated pebble of grey argillite, with an imperfect cleavage, which has either been slightly ground all over and smoothed, or become so from gentle attrition in a river bed. The butt is the narrower end, and has been fractured. The anterior end is narrow, and the cutting edge limited in extent, bluntly ground, with many of the scratches, especially those in a transverse direction, remaining. It seems probable that this stone was selected on account of a certain small degree of curvature in the direction of its greatest length, a circumstance also noticeable in the last tomahawk described. Length, $8\frac{1}{2}$in.; breadth, $1\frac{7}{8}$in.; thickness, $1\frac{5}{8}$in.; weight, 1℔. 7oz.

The last implement of this section is equally interesting from the fact that it is quadrangular in section, the fissile nature of the rock, a hornblende schist, apparently having been taken advantage of to cleave, rather than chip, the weapon out of an irregular fragment of rock. The cutting edge is narrow, but well rounded, the well-polished bevel being only on two of the faces of the roughly-shaped rhomb. Length, $4\frac{6}{8}$in.; breadth, $1\frac{5}{8}$in.; thickness, $1\frac{4}{8}$in.; weight, 8oz.

The length and shape of the two largest of the tomahawks described under this section impresses me with the idea that they may have been held in the hand when used, without any form of hafting, probably grasped in the palm rather than held by the fingers as represented by the late Rev. P. MacPherson.* In such a case it would be necessary to transfer them to the third section of our arrangement.

5. *Chisel-shaped Type.* A form of tomahawk rarely met with. I have lately figured one from Port Stephens,† and have two additional now before me. The first was ploughed up from recent alluvium near Hexham, and presented to the Mining and Geological Museum by Mr. R. W. Thompson, M.L.A. (Pl. XXXII., figs. 1 and 2). It is composed of chert of a dull drab colour, derived, Prof. T. W. E. David has no doubt, from a chert bed in the Upper Coal Measures at Nobbys, Newcastle. The implement is oblong, perfectly flat on both sides, slightly increasing in width towards the anterior end, flat along the top and bottom edges, and bevelled on one lateral face only. The bevel is smooth and a little full, but the cutting edge is remarkably true and well rounded. It is slightly flaked at the base. The measurements are :—Length, 8in.; breadth, $2\frac{7}{8}$in.; thickness, 1in.; weight, 1lb. 4oz.

The physical character of the matrix has in this instance accommodated itself to the preparation of this implement by breaking up into more or less transversely tabular pieces. This the aboriginal owner improved on by grinding the two faces of one of the ends.

The second tomahawk of this description is rather less in size and thickness than the first. It is probably the one described in the record of the exhibit of Mr. Griffin's tomahawks, "as a flat piece of slate." The composition, as a matter of fact, is greenish-grey altered mudstone or sandy slate. The sides of the tomahawk are smooth and flat, but not polished, square edged, and as might be expected from the comparative tenuity, the amount of the bevelled surface is small, and the cutting edge rather obliquely curved. Length, 6⅛in.; breadth, 2½in.; thickness, ⅝in.; weight, 6oz.

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* Journ. R. Soc. N.S. Wales for 1885 [1886], xix., 2nd Pl., f. 7.

† Proc. Linn. Soc. N. S. Wales, 1890, v. (2), Pt. 2, p. 291, t. 13, f. 11.

In the note of explanation referred to, the suggestion is made that these flat tomahawks are "probably used to cut bark." I would enlarge the scope of this happy suggestion by enquiring, is it possible that they were also used for incising the figures and designs employed in decorating trees around graves, or perhaps even Bora grounds?

The late Rev. P. MacPherson figured* a rather similar tomahawk to the above and described it as a "chisel."

Section B.—*With a hafting groove.*

1. *Ovate Type.* A very fine specimen of the grooved tomahawk, for the better reception of the withy, or handle, in hafting, has been communicated by Mr. C. W. De Vis, from the Queensland Museum collection. (Pl. XXXI., figs 3 and 4).

I am not at present prepared to enumerate the number of types which may be found under this heading, the number of illustrations representing them being remarkably small, and their occurrence in collections equally so. I infer, however, that they indicate a higher type of implement than in those cases where the stone head is only hafted with gum.

This tomahawk from Northern Queensland is a long oval in shape, composed of a brown, fine quartzite, heavy and bluntly rounded at the butt, the bevelled anterior sides without signs of friction, but the surfaces roughened and unpolished. The cutting edge has a similar irregularity of outline to so many others, and is not sharp. The groove for the reception of the handle is six-eighths of an inch wide, two-eighths of an inch deep, and is almost equi-distant from both ends. The course of the groove is not directly across the pebble, but is directed forwards on the sides of the tomahawk towards the anterior end. This was doubtless intended to give the handle a better grip of the stone. The measurements are:—Length, 5½in.; breadth, 3½in.; thickness, 2in.; weight, 1lb. 12oz.

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* Journ. R. Soc. N. S. Wales for 1885 [1886], xix., 1st Pl., f. 3.

According to Smyth* this is a rare form of tomahawk, and is known as *Pur-ut-three* in Victoria. He figured one from a kitchen-midden at Lake Condah, and it was identified by an aboriginal as used for splitting open large trees. It is rather larger than the Queensland implement, being eight inches long and five wide, with a weight of four pounds eight and a-half ounces; the groove is also much nearer the butt.

Two examples of the grooved tomahawk are given by MacPherson† from Telligerry Creek, Port Stephens, N. S. Wales, both slightly larger and heavier than the Queensland implement. The figured example is also much broader across the cutting edge. Mr. MacPherson appeared to be in doubt whether or no these stones might not be used as sinkers as well as tomahawks, but I think little doubt need be entertained that the latter supposition is their true use. The occurrence of grooved tomahawks at distances so far apart as North Queensland, Port Stephens, and Lake Condah, Normanby, Victoria, establishes the wide distribution of this method of hafting.

That we have under the present heading more than one form of tomahawk is, I think, manifest from another figure given by Smyth‡ of an implement found at Winchelsea, in Victoria. In shape it is allied to the small deltoid type of out first section, the butt truncate, and the groove situated far back: It was polished all over and had a keen cutting edge.

This method of hafting is not confined to the rarer form of Australian tomahawk, but was in practice amongst the men of the so-called Neolithic Period, throughout Central and South-western Europe, and was used in connection with tools regarded as hammer-stones or mauls,§ and found usually in the neighbourhood, if not actually in, old mines, "principally copper mines."

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* Aborigines of Victoria, 1878, I., p. 368, f. 183.

† Journ. R. Soc. N. S. Wales for 1885 [1886], xix., p. 114, 1st Pl., f. 4.

‡ Aborigines of Victoria, 1878, I., p. 372, f. 195.

§ Evans, Ancient Stone Implements, &c., Gt. Brit., 1872, p. 208.

II.—Hafted Axes.

Under this name I propose to separate one of the largest forms of stone "tomahawk" used by the Australian aborigines. That such very large and heavy implements as described by the Rev. P. MacPherson from the Paterson River,[*] measuring 8½ × 5¾ × 1¼ inches, and weighing 4℔. 7oz.; from Lake Tyers by Smyth,[†] measuring 6½ × 3¼ × 1¼, and weighing 1℔. 12½oz.; and by myself from Kimberley,[‡] were put to the same purposes as the generally smaller tools usually known under the name of tomahawks, is, I think, very improbable, if not negatified by their own weight and appearance. Mr. Smyth also quotes[§] a similar large axe from the Paroo River, South-west Queensland. "It is an oval-shaped weapon, highly finished, and, for a great extent around the cutting edge, well polished," measuring 8in. × 6in. × 2in., and about four pounds in weight.

He again remarks: "The natives of some parts of Victoria had large stone axes made of basaltic rock, which were used for splitting trees." One was 8 × 5 × 2, and four pounds eight ounces in weight. Another found at Ballarat was 8 × 4, and about five pounds avoirdupois. These were grooved, and "implements of this size are very rare."[||]

The forms of these axes, in themselves typical, at once distinguish them from the ordinary tomahawk.

A very fine example has been presented to the Mining and Geological Museum by Mr. H. A. Maclean, from Mogul Creek, Bulloo River, Thargomindah. It is a very large and heavy oval pebble of dark green diorite, the shape of which has been cleverly taken advantage of to produce a large, beautifully curved, and very perfect cutting edge. The widest portion of the axe is immediately at the hind termination of the latter. At the butt slightly and along one of the edges, the bulk has been reduced somewhat by chipping, and then quite two-thirds of the surface smoothed by polishing, many of the transverse striæ being still visible in places. The measurements of this fine implement are:—Length, $7\frac{6}{8}$in.; breadth, 6in.; thickness, $2\frac{1}{8}$in.; weight, 5℔. 1oz.

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[*] Journ. R. Soc. N. S. Wales for 1885 [1886], xix., p. 115, 1st Pl., f. 5.

[†] Aborigines of Victoria, 1878, I., p. 366, f. 178.

[‡] Proc. Linn. Soc. N. S. Wales, 1890, v. (2), t. 14.

[§] *Loc. cit.*, p. 376.

[||] *Loc. cit.*, p. 361.

The existence of these large implements along the Bulloo River is mentioned by Curr, who, speaking of the Wonkomarra Tribe, inhabiting the river within a radius of twenty miles of Thargomindah, says*: "Their tomahawks, before they obtained iron ones from the Whites, were of green stone, as large as an American axe, the sides rather roughly chipped, and the edges ground and smoothed."

As another example of this type may be taken the axe brought from Kimberley by Mr. W. W. Froggatt, and described in a late paper by myself.† As compared with the present one it is smaller and lighter.

A second axe, sent to me by Mr. De Vis, is slightly larger, and is more securely mounted (Pl. XXXIII.). It is one of the finest examples I have seen, and is from Thornborough, N. Queensland. Like so many others, it is simply a large pebble, oval and flat, and more or less in the rough, the only manipulation it has undergone being the grinding of the cutting edge, which has produced a much less perfect curve than the axe just described from Mogul Creek. The pebble is a dolerite. The measurements are as follows:—Length, $8\frac{6}{8}$in.; breadth, 5in.; thickness, $1\frac{4}{8}$in.; weight, 4℔. The handle is a heavy split cane, bent, and passed round the stone, and held in place, like another axe from the Herbert Gorge, by whipping the handle, immediately below the head, with cane riband, but no gum is used. The whip is made doubly secure by passing the free ends over and under, thus as it were forming a collar. The length of the handle doubled is about two feet ten inches. The general aspect of this axe strongly recalls to mind the similar weapons from Lake Tyers in Gippsland figured by Smyth,‡ more particularly as regards the method of tying, the absence of gum mounting, and the shape of the stone heads.

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* The Australian Race, 1886, ii., p. 37.

† Proc. Linn. Soc. N. S. Wales, 1890, v. (2), p. 370, t. 14.

‡ Aborigines of Victoria, 1878, I., p. 366, f. 177, 178.

The late Rev. P. MacPherson has described large axes from N. S. Wales, on which "numerous dints, abrasions, and scratches are strongly suggestive of the device of driving stone pegs between the handle and the hatchet for the purpose of tightening the handle."* Neither of the foregoing axes shows such traces, nor has any example with similar markings yet come under my notice. It is a very peculiar and at the same time suggestive fact that by the means of a bent wooden handle, the whole of the Australian tribes, except some of the West Australians, who have used tomahawks or axes, have so fastened them. They do not appear ever to have hit upon the plan of boring the stone heads for the insertion of a single handle, similar to some of the perforated Neolithic hammers of the Old World.† Indeed, a very interesting circumstance is related by Col. A. Lane-Fox,‡ bearing on this peculiarity. He states§ that a European axe-head was found at an old native camping place, the hole of which the natives, unable to comprehend its object, had carefully filled with their cementing medium, and hafted by means of a withy, bent round the *outside* of the axe-head, in accordance with their traditional custom.||

So far as I can gather, the distribution of these large axes appears to be limited. We have evidence that they were used in Queensland from north to south; the Rev. P. MacPherson knew of their existence in N. S. Wales. On the other hand, Smyth states:¶ "I have never seen any of these large implements in the hands of the natives of Victoria." At the same time, they were evidently in use in the latter colony in former days, for the same author remarks:** "There are found also in the mirrn-yong heaps and in the soil very large tomahawks of different forms, which, it is said

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* Journ. R. Soc. N. S. Wales for 1885 [1886], xix., p. 114.

† See Evans' Ancient Stone Implements, &c., Gt. Brit., 1872, p. 196 *et seq.*

‡ Now General Pitt-Rivers.

§ Report Brit. Assoc. Adv. Sci. for 1862 [1863], p. 160.

|| Aborigines of Victoria, 1878, I., p. 374.

¶ *Ibid.*, p. lv.

** *Ibid.*, p. liv.

by the natives, were employed in splitting trees." One of these, found at Daylesford, was nearly fourteen inches in length and five inches in breadth.

Such large and heavy implements are not tomahawks in the strict sense of the word, applying the latter term to forms similar to those described under Section A. Indeed the appearance of the fine tool from Thornborough, with its strong and firmly fixed handle, stamps it at once as an implement more in accordance with our idea of an axe, and could not have been put to such a use as the implement from the Herbert Gorge, to be described shortly.

III.—HAND-AXES AND WEDGES.

By this term I wish to designate those axes which bear evidence of having been simply held in the hand, and so used, or used as a wedge, rather than mounted in a withy. The Rev. P. MacPherson has drawn attention to this form of axe in the following words: * "Three of the third class of large hatchets are distinguished by another peculiarity: they have a piece knocked out of one corner so as to fit to the broad part of the thumb where it spreads out into the hand. They could thus be used without a handle, or when it came off." Speaking of the Cooper's Creek tribes, Mr. A. W. Howitt says: "They grasp the tomahawk with the fingers and thumb, holding the blunt end in the hollow of the hand."†

A tool unmistakably meant to be held in the hand, although no finger-holds are seen, has been forwarded by Mr. C. W. De Vis, found at Toowong, near Brisbane. It seems to have been a rough weather-worn piece of rock, with traces of flakes struck off round the edges, but, generally speaking, advantage appears to have been taken of its flattened, large, oval form. A naturally weathered bevelled margin exists on one face, but the other is ground and polished. The peculiarity of this tomahawk, however, lies in the cutting away of the sides at the butt, until a handle has been formed capable of being grasped by the hand. This is, I think,

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* Journ. R. Soc. N. S. Wales for 1885 [1886], xix., p. 115.

† Smyth's Aborigines of Victoria, 1878, I., p. 388 *(note)*.

self-evident from the shape of the implement, for in this state it could hardly have been securely fastened between the halves of a bent handle; but in whatever way it was held, the implement was awkward and unwieldy. The cutting edge is unsymmetrical, and the bevel on each face unequal. The stone is a basalt, much weathered. Measurements:—Length, $9\frac{6}{8}$in.; breadth, $6\frac{7}{8}$in.; thickness, $1\frac{1}{2}$in.; weight, $5\frac{1}{2}$℔.

The Queensland Museum possesses two remarkably good oval axes. One of these (Pl. xxxiv.), a large flat tool composed of a fine micaceous mudstone, from the Herbert Gorge, and a travelled stone or pebble, has had its original form utilised by the cunning aborigine, who has reduced its pristine bulk by rubbing, the irregularly concentric striæ on the surface, arising from the grinding process, being still visible. The broader end has been bevelled off to produce a cutting edge with a similarly wide sweep and truthfulness of outline to the specimen last described. The butt is rather attenuated, the size here having been again reduced by friction above and below. The extremity of the butt is grasped by the flimsiest of withies—a supple stick of *Eremophila*, so Mr. Turner thinks, passed round it and retained in position by a "stop" of black gum, with which the butt is enveloped, but without in any way impinging on the withy, which remains free and loose. The withy is simply bent round the stone head without being fastened in any other way, whether by pegs between the stone and handle, as described by the Rev. P. MacPherson,* or otherwise. In this condition it is held precisely as a blacksmith holds his cold chisel when about to be struck by the hammer. The two portions of the handle are held together, immediately under the head, by a piece of thin split cane. The withy is in one piece, about twenty-two inches long when doubled, and where bent the bark has been removed and the fibre separated to render the bend supple. The bevel is rather flat. The general measurements are:—Length, $8\frac{1}{8}$in.; breadth, $5\frac{4}{8}$in.; thickness, $1\frac{4}{8}$in.; weight, 3℔. 2oz.

One of the most remarkable implements I have yet met with is an axe, triangular in shape, and to some extent resembling the old-fashioned wood-cutter's axe. It is from Fraser's Island, and is again from the Queensland Museum. The cutting edge is the longest side, the butt being obtusely pointed, the rapidly increasing width, with the slightly concave edges, giving to it the old axe-like form referred to, and which effect may possibly have been heightened by friction. The sides are flat, and the edge is bevelled on one only. It is composed of a hard drab sand-rock, and the cutting edge, as might have been expected, is somewhat blunt. The concavity of the upper and lower edges gives to the cutting edge at its ends an upwardly swelling appearance. There are no signs of a hafting groove, flaking of the surface, or abrasions caused by pegs driven to tighten a handle. The measurements of this implement are :—Length, $8\frac{1}{2}$in. ; breadth, $6\frac{6}{8}$in. ; thickness, $1\frac{4}{8}$in. ; weight, $2\frac{3}{4}$lb.

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* Journ. R. Soc. N. S. Wales for 1885 [1886], xix., p. 114.

Triangular tools of this description seem to be rare, but Smyth records one from Coranderrk, Victoria, but it is not clear whether it was an axe or a tomahawk.

The question naturally arises, are the implements from Toowong, the Herbert Gorge, and Fraser's Island, axes or wedges? I see nothing to prevent them from being wedges, but, on the contrary, a good deal in favour of such a use. In describing the Paterson axe, Mr. MacPherson said*—"its size is suggestive of its having been used as a wedge for splitting," and, "there is an appearance about the edge of this instrument which gives the idea of its having been forced through hard wood." The shape of the implements from Toowong and Fraser's Island renders it difficult to imagine a handle attached, whilst their size is against a simple grasping by the hand. On the other hand, the slight withy placed round the Herbert Gorge instrument, provided it is genuine, is enough to denote its use, that of being held in one hand and struck by some other body, probably a piece of wood. The presence of the withy indicates that it was not a manual weapon in the strict sense of the word, whilst the lightness of the withy equally forbids the use of the instrument as an axe.

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* Journ. R. Soc. N. S. Wales for 1885 [1886], xix., p. 115.

Before concluding this part of the subject, I wish to draw attention to a portion of a tomahawk, which is with difficulty referred to its proper place in the series. It forms one of Sir Wm. Macleay's Collection, and is from N. S. Wales. Originally a flattened pebble, it has been further reduced by rubbing, and is unflaked. The interest, however, centres itself in the sharp point the anterior end has been brought to, an unusually pointed end and acute cutting edge for an Australian tomahawk. The finish of the tool is excellent, although the scratches still remain caused by the lateral reduction it has undergone. These are all in one direction. It is composed of a dark green chloritic greywacke, showing faint schistose structure. The rock has probably been derived from the alteration of a mudstone.

It may not be out of place to point out in conclusion a few facts deducible from the study of Australian stone tomahawks in relation to what may be termed their physical structure, derived from the observations of Smyth,* Cox,† MacPherson,‡ Knight,§ Anderson,|| other minor observers, and my own investigations.

Except on the broad lines laid down in the present communication there is no uniformity in size or shape, but whether tomahawks or axes, they are usually longer than broad, the exception being our third type of Section A, Group I.

There appear to have been three well marked methods of preparation :—(1) Shaped by directed blows only; (2) The same accompanied by the polishing of the cutting edge; (3) Selected pebbles, polished at the cutting edge, but not shaped or flaked.

As a rule, stones flattened laterally were selected, and following this conception, the choice seems to have been given to water-worn pebbles.

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* Aborigines of Victoria, 1878, I., pp. liv. and 365.

† Proc. Linn. Soc. N. S. Wales, 1875, I., p. 21.

‡ Journ. R. Soc. N. S. Wales for 1885 [1886], xix., p. 113.

§ Report Smithsonian Institution for 1879 [1880], p 213.

|| Records Geol. Survey N. S. Wales, 1890, ii., Pt. 2, pp. 73-81.

The smoothed and polished portions of these implements vary greatly in extent and finish, and seem to have been studied only so far as to produce an efficient cutting edge. Grinding may have taken place alone, or grinding and polishing may occur conjointly in the same implement. Such a thing as a wholly polished tomahawk, without the assistance of a natural agent, has never come under my notice.

The cutting edge is, with remarkably few exceptions, always curved, and the curvature very rarely amounts to a semicircle. Mr. William Anderson, however, cites two exceptions to this rule, one a pebble from the conglomerate of the Gundabooka Mountain, to the west of Bourke, in which the cutting edge is "nearly straight." A straight cutting edge is also exemplified in the third tomahawk of the deltoid or subtriangular type under Section A. The cutting edge is at times ground very sharp; "so sharp," says Rear-Admiral P. P. King, "that a few blows serve to chop off the branch of a tree.*

The butt is never worked, only chipped; but the production of tomahawks by chipping alone is very rare throughout Central and Eastern Australia, although common in Western Australia. Mr. Anderson mentions two examples from N. S. Wales.† Chipped weapons are flaked from the edges inwards, the size of the flakings decreasing in size forwards. The sides are sometimes grooved to assist in firmly attaching the handle.

Single stones appear to have been universally used over the entire Continent, with the exception of Western Australia, where two are employed, attached to the same handle, placed butt to butt, and united in the hafting.

Tomahawk or axe-heads perforated for the reception of a handle are unknown, with the exception of an instance recorded by Dr. J. C. Cox,‡ which appears to point in that direction. He says—"But specimens I have only recently received from the Macdonald

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* Intertrop. Coasts of Australia, ii., p. 69.

† Records Geol. Survey, *loc. cit.*, p. 77.

‡ Proc. Linn. Soc. N. S. Wales, 1875, I., p. 23.

River, a tributary of the Hawkesbury, lead me to assume that in some instances the handles were fixed in the centre of the stone, so that both edges were used."

The bevel varies considerably, and depends for its extent on the original thickness of the stone employed. It is always convex or arched, but seldom ever bilaterally symmetrical.

It is possible for general classificatory purposes to separate our stone implements of this description into three broad sections:—A. Tomahawks; B. Axes; C. Hand-Axes and Wedges.

The use of such stone implements is not universal throughout Australia, for Curr informs* us that certain tribes in his Western Division, and the western part of his Central Division, or the Minung Tribes do not use tomahawks at all.

As regards the hafting of tomahawks, six methods were known:—(1) The handle formed of a single piece, and attached by a heavy swathing of gum; (2) As a withy passed over the stone head and secured *(a)* with gum alone, or *(b)* gum and lashing; (3) As a withy reposing in the grooved sides of the head; (4) Similar to last, but handle twisted on itself;† (5) Head lashed to the handle after the fashion of the New Zealander or Dyak;‡ (6) Head fixed with lashing and gum in a cleft stick.§

The composition of the cementing medium varies considerably in different tribes.

XVII.—*Modernised Aboriginal Tomahawks.*

In a recent Paper, after describing some flint knives, I showed the adoption and continuity of the aboriginal idea when brought in contact with articles of European manufacture. The rapidity with which the black abandons his stone tomahawk in favour of the white man's iron instrument is well known, but amongst the half-civilized this seems to have been preceded by the adoption of both aboriginal and civilized materials. Thanks again to Mr. De Vis, I am able to show this by the four following implements, all made of scrap-iron, picked up, or, more probably stolen, and converted into tomahawks in the usual way by passing a withy round and securing the head with gum.

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* Australian Race, 1886, I., pp. 287 and 367.

† In South Australia, see Knight, Report Smithsonian Inst. for 1879 [1880], p. 237, f. 38b.

Said to be Australian by J. G. Wood, Nat. Hist. Man. 1870, p. 32, f. 2.

§ Evans, Stone Implements Gt. Brit., 1872, p. 151.

The first implement is formed of a large piece of flat iron, nine and a-half inches long and three and a-half wide ; but it is very difficult to say what it has formed a part of, unless it be part of a wheel tire (Pl. XXXIV.). It has been severed at the butt from the remainder simply by means of cutting. The two faces of the anterior end have been ground in the usual way, producing the bevelled surfaces and cutting edge. The handle is one foot in length, and it weighs three pounds eleven ounces. This probably represents an axe.

The second implement has been made in a precisely similar manner, but the top edge of the iron is concave, and the bottom horizontal. Had the lower edge been convex, I should have suggested that this had once formed a portion of a small wheel tire. The head is held in place by gum, and a string collar is passed round under it. I think we may justly regard this as a tomahawk ; it measures four and a-half inches long and two and a-half wide. The handle is ten inches.

The third presents no difficulties whatever in regard to the object selected to form the head. It is a piece of a horse-shoe (Pl. XXXVI.), six inches in length, and differs from the former specimens in that it is single-headed. The iron is securely fastened by an over and over lashing of a rush-like plant, and the whole enveloped in gum. The handle is fifteen and a-half inches long, and together with the head producing a very handy and efficient weapon as well as implement. It is from the Walsh River, and forcibly recalls to mind the peculiar quartzite-headed axe I figured* some time ago from Northern Queensland.

The fourth, and last, is equally cunningly adapted, and is formed either of a cold-chisel or a ship's bolt. The head of the chisel forms the butt, and the chisel edge the cutting portion. The former is exposed from the gum mounting, and probably served the purpose of a hammer. The lashing in this instance seems to be string, and is thickly coated with gum. The chisel is five and a-half inches long, and the handle one foot three inches.

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* Proc. Linn. Soc. N. S. Wales, 1890, v. (2), t. 12, f. 14.

The horse-shoe iron and the chisel are not confined by a collar holding the two halves of the handle together, but are held in position as described by string and gum. Neither of the handles is tied at the base, similar to the method of doubly securing some of those of stone tomahawks.*

EXPLANATION OF PLATES.

Plate xxix.

Fig. 1.—Tomahawk (oblong-ovate type), highly finished, of greenish-black diorite. Braidwood; Mr. J. W. Penney. ½ nat.

Fig. 2.—Side view of the same.

Fig. 3.—Tomahawk (oblong-ovate type), flaked, of silicified claystone. New England; Mining and Geological Museum (Mr. Blomfield).

Fig. 4.—Side view of the same.

Plate xxx.

Fig. 1.—Tomahawk (ovate type), of a felspathic quartzite. Macleay Collection.

Fig. 2.—Side view of the same.

Fig. 3.—Tomahawk (deltoid type), of dark green diabase (?) Normanton, Queensland; Queensland Museum (Mr. C. W. De Vis).

Fig. 4.—Side view of same.

Plate xxxi.

Fig. 1.—Tomahawk (gad-shaped type), of a dark green diorite. N. S. Wales; Mining and Geological Museum.

Fig. 2.—Side view of the same.

Fig. 3.—Tomahawk with a hafting groove (ovate type). North Queensland; Queensland Museum (Mr. C. W. De Vis).

Fig. 4.—Side view of the same.

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* See Smyth, Aborigines of Victoria, 1878, I., p. 367, f. 179, p. 368, f. 181.

PLATE XXXII.

Fig. 1.—Tomahawk (chisel-shaped type), drab-coloured chert. Hexham, N. S. Wales; Mining and Geological Museum (Mr. R. W. Thompson).

Fig. 2.—Side view of the same.

PLATE XXXIII.

Axe, hafted; a large pebble of dolerite. Thornborough, Queensland; Queensland Museum (Mr. C. W. De Vis).

PLATE XXXIV.

Wedge, with a slight withy handle. Herbert Gorge, Queensland; Queensland Museum (Mr. C. W. De Vis).

PLATE XXXV.

Axe, modernised; made of portion of a wheel tire. North Queensland; Queensland Museum (Mr. C. W. De Vis).

PLATE XXXVI.

Tomahawk, modernised; formed of portion of a horse-shoe. Walsh River; Queensland Museum (Mr. C. W. De Vis).